



LaSalle County Station
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10 CFR 50.73

RA17-035

April 14, 2017

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

LaSalle County Station, Unit 1
Renewed Facility Operating License No. NPF-11
NRC Docket No. 50-373

Subject: Licensee Event Report 2017-003-00, Automatic Reactor Scram due to
Main Generator Trip on Differential Current During Back-Feed Operations

In accordance with 10 CFR 50.73(a)(2)(iv)(A), Exelon Generation Company, LLC
(EGC) is submitting Licensee Event Report (LER) Number 2017-003-00 for LaSalle
County Station, Unit 1.

There are no regulatory commitments in this letter. Should you have any questions
concerning this report, please contact Mr. Guy V. Ford, Jr., Regulatory Assurance
Manager, at (815) 415-2800.

Respectfully,

A handwritten signature in black ink, appearing to read "William J. Trafton".

William J. Trafton
Site Vice President
LaSalle County Station

Enclosure: Licensee Event Report

cc: Regional Administrator – NRC Region III
NRC Senior Resident Inspector – LaSalle County Station

**LICENSEE EVENT REPORT (LER)**

(See Page 2 for required number of digits/characters for each block)

(See NUREG-1022, R.3 for instruction and guidance for completing this form
<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1022/r3/>)

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Information Services Branch (T-2 F43), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by e-mail to Infocollects.Resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

1. FACILITY NAME

LaSalle County Station, Unit 1

2. DOCKET NUMBER

05000373

3. PAGE

1 OF 3

4. TITLE

Automatic Reactor Scram due to Main Generator Trip on Differential Current During Back-Feed Operations

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
02	13	2017	2017	003	00	04	14	2017	NA	NA
9. OPERATING MODE			11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)							
1			<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)		<input type="checkbox"/> 50.73(a)(2)(ii)(A)		<input type="checkbox"/> 50.73(a)(2)(viii)(A)		
			<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)		<input type="checkbox"/> 50.73(a)(2)(ii)(B)		<input type="checkbox"/> 50.73(a)(2)(viii)(B)		
			<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)		<input type="checkbox"/> 50.73(a)(2)(iii)		<input type="checkbox"/> 50.73(a)(2)(ix)(A)		
			<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)		<input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A)		<input type="checkbox"/> 50.73(a)(2)(x)		
10. POWER LEVEL 100			<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)		<input type="checkbox"/> 50.73(a)(2)(v)(A)		<input type="checkbox"/> 73.71(a)(4)		
			<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)		<input type="checkbox"/> 50.73(a)(2)(v)(B)		<input type="checkbox"/> 73.71(a)(5)		
			<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)		<input type="checkbox"/> 50.73(a)(2)(v)(C)		<input type="checkbox"/> 73.77(a)(1)		
			<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)		<input type="checkbox"/> 50.73(a)(2)(v)(D)		<input type="checkbox"/> 73.77(a)(2)(i)		
			<input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 50.73(a)(2)(i)(B)		<input type="checkbox"/> 50.73(a)(2)(vii)		<input type="checkbox"/> 73.77(a)(2)(ii)		
			<input type="checkbox"/> 50.73(a)(2)(i)(C)		<input type="checkbox"/> OTHER		Specify in Abstract below or in NRC Form 366A			

12. LICENSEE CONTACT FOR THIS LER

LICENSEE CONTACT

Joe Fiesel, Maintenance Director

TELEPHONE NUMBER (Include Area Code)

(815) 415-2500

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
B	FK	87	G080	Y	NA	NA	NA	NA	NA

14. SUPPLEMENTAL REPORT EXPECTED☐ YES (If yes, complete 15. EXPECTED SUBMISSION DATE) ☒ NO**15. EXPECTED SUBMISSION DATE**

MONTH	DAY	YEAR
NA	NA	NA

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On February 13, 2017, LaSalle County Station Unit 1 was in Mode 1 at 100 percent power and Unit 2 shut down for a planned refueling outage. At 2309 CST, a reactor scram signal was received on Unit 1 due to turbine control valves fast closure while the station was aligning back-feed operation to the Unit 2 main power transformer (MPT). The Unit 1 turbine trip was due to the main generator trip on differential current. The plant was placed in a stable condition with reactor pressure maintained by the turbine bypass valves and reactor water level controlled using feedwater. Unit 2 was unaffected by the event.

The root cause of the Unit 1 trip on differential current was a marginal generator differential relay design that was prone to responding to faults outside its zone of protection. Both units' 345 kV ring buses were connected together through the cross-tie bus, which allowed the Unit 1 generator to supply some of the electrical current that resulted in its differential circuit to create an unbalanced current that actuated the differential relay.

This event is reportable in accordance with 10 CFR 50.73(a)(2)(iv)(A) as an event or condition that resulted in manual or automatic actuation of the reactor protection system (RPS), including reactor scram. There were no safety consequences associated with the event since RPS and other emergency safety systems functioned as designed.

**LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET**

(See NUREG-1022, R.3 for instruction and guidance for completing this form
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1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
LaSalle County Station, Unit 1	0500073	2017	- 003	- 00

NARRATIVE**PLANT AND SYSTEM IDENTIFICATION**

LaSalle County Station Unit 1 is a General Electric Boiling Water Reactor with 3546 Megawatts Thermal Rated Core Power.

The affected system is the 345 kV switchyard. The switchyard consists of a ring-bus arrangement for each unit and a cross-tie bus that interconnects the units' ring buses. Each unit has a main power transformer (MPT), system auxiliary transformer (SAT), and a unit auxiliary transformer (UAT). Each of the two main generators is connected to two half-size main transformers and a UAT through isolated phase electrical bus ducts. The main power transformers step up the voltage, where power is delivered to the switchyard. The main generator and associated isolated phase bus duct is protected from electrical faults by several relaying features that will trip the generator to protect it from damage.

CONDITION PRIOR TO EVENT

Unit(s): 1
Reactor Mode(s): 1

Event Date: February 13, 2017
Mode(s) Name: Power Operation

Event Time: 2309 CST
Power Level: 100 percent

DESCRIPTION OF EVENT

On February 13, 2017, LaSalle County Station Unit 1 was in Mode 1 at 100 percent power, while Unit 2 was in a planned refueling outage. Unit 2 switchyard switching activities were in progress necessary to establish electrical back-feed power supply to the Unit 2 MPT. Switching activities included closing a main generator output breaker on Unit 2.

At 2309 hours CST, the Unit 1 main generator received a trip on the 'B' phase differential current relay and subsequent main generator lock-out, which resulted in a Unit 1 automatic main turbine trip and subsequent Unit 1 automatic reactor scram due to fast closure of the turbine stop valves. In response to the event, one of the safety relief valves actuated in the relief mode upon the turbine trip and subsequently reset with tailpipe temperature returning to normal. The plant was in a stable condition with reactor pressure maintained by the turbine bypass valves. Reactor water level was controlled with feedwater, and all control rods fully inserted for the scram.

CAUSE OF EVENT

The root cause of the Unit 1 trip on differential current was a marginal generator differential relay design prone to responding to faults outside its zone of protection. Since both units' 345 kV ring buses are connected together through a cross-tie bus, this allowed the Unit 1 generator, which is the closest and strongest source, to supply some of the current and resulted in its differential circuit creating an unbalanced current that actuated the differential relay.

Contributing to this event was the current switchyard alignment methodology used for MPT back-feed operations. The current methodology challenges the margin of electro-mechanical differential current protective relays. An additional contributing cause was the use of larger transformers in place of the existing MPT, which changed the nature of the in-rush transient and introduced different current transformers into the differential relay scheme.

There has been operating experience regarding similar consequences related to similar differential relay scheme designs and related to transformer in-rush transients. Although some of this experience was recognized by the station and the corporate organization, the opportunity to change the back-feed switching scheme to mitigate the in-rush transient was missed.

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LaSalle County Station, Unit 1	0500073	2017	- 003	- 00

NARRATIVE**REPORTABILITY AND SAFETY ANALYSIS**

This event is reportable in accordance with 10 CFR 50.73(a)(2)(iv)(A) as an event or condition that resulted in manual or automatic actuation of the reactor protection system (RPS), including reactor scram. There were no safety consequences associated with the event since the RPS and other emergency safety systems functioned as designed.

CORRECTIVE ACTIONS

The immediate corrective action was to revise future switching orders to break the tie between the Unit 1 and Unit 2 345 kV ring buses when performing a back-feed to the MPT. The station also revised switching orders to isolate the Unit 1 and Unit 2 345 kV ring buses for energizing the SAT for each unit and performing generator synchronization operations.

The corrective action to prevent recurrence of a unit scram during back-feed operations is to install a more robust generator differential relay protection scheme. In addition, the switching scheme will be revised to break the tie between the Unit 1 and Unit 2 ring buses when the MPTs are energized.

PREVIOUS OCCURRENCES

A review of station Licensee Event Reports for the past three years related to reactor trips identified instances where a reactor manual or automatic scram was inserted. However, there were no previous occurrences related directly to main generator operation at the station. One event was identified related to turbine-generator run-back as follows.

- LER 374-2017-001-00, Manual Reactor Scram due to Turbine-Generator Run-Back Caused by Stem-Disc Separation in Stator Water Cooling Heat Exchanger Inlet Valve

On January 23, 2017, operators initiated a manual scram of the Unit 2 reactor as a result of observing a generator run-back due to a generator stator winding cooling (GC) system malfunction. Inspections of the GC components were performed while the unit was shut down for a planned refueling outage. The cause of the GC system failure was stem-disc separation in the 'A' GC heat exchanger inlet valve. This event was reportable in accordance with 10 CFR 50.73(a)(2)(iv)(A) as an event or condition that resulted in manual or automatic actuation of the RPS. There were no safety consequences associated with the event since there was no loss of safety function, and the RPS functioned as designed.

COMPONENT FAILURE DATA

Manufacturer: General Electric Company [G080]
Device: Main Generator Differential Current (CFD) Relay Trip
Component ID: GE Model CFD Differential Relay 1687-MP010B